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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/782,746	02/19/2004	Andrew J. Peltoma	17310-296454	1661
25764	7590	12/27/2005	EXAMINER	
FAEGRE & BENSON LLP PATENT DOCKETING 2200 WELLS FARGO CENTER MINNEAPOLIS, MN 55402			VAN, LUAN V	
			ART UNIT	PAPER NUMBER
			1753	

DATE MAILED: 12/27/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

## Office Action Summary

Application No.

10/782,746

Applicant(s)

PELTOMA ET AL.

Examiner

Luan V. Van

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 29 November 2005.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-22 is/are pending in the application.
- 4a) Of the above claim(s) 18-22 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-17 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date \_\_\_\_\_
- 4) ☒ Interview Summary (PTO-413)  
Paper No(s)/Mail Date \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_

**DETAILED ACTION**

***Election/Restrictions***

Restriction to one of the following inventions is required under 35 U.S.C. 121:

- I. Claims 1-17, drawn to a method, classified in class 205, subclass 118.
- II. Claims 18-22, drawn to a product, classified in class 360, subclass 103.

The inventions are distinct, each from the other because of the following reasons:

Inventions I and II are related as process of making and product made. The inventions are distinct if either or both of the following can be shown: (1) that the process as claimed can be used to make other and materially different product or (2) that the product as claimed can be made by another and materially different process (MPEP § 806.05(f)). In the instant case the product as claimed can be made by another and materially different process such as sputter deposition or chemical vapor deposition.

Because these inventions are distinct for the reasons given above and have acquired a separate status in the art as shown by their different classification, and the search required for Group I is not required for Group II, restriction for examination purposes as indicated is proper, restriction for examination purposes as indicated is proper.

During a telephone conversation with the Applicant's representative, Mr. Walter Linder, on 11/29/05 a provisional election was made without traverse to prosecute the invention of Group I, claims 1-17. Affirmation of this election must be made by applicant in replying to this Office action. Invention of Group II is withdrawn from further

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consideration by the examiner, 37 CFR 1.142(b), as being drawn to a non-elected invention.

Applicant is advised that the reply to this requirement to be complete must include an election of the invention to be examined even though the requirement be traversed (37 CFR 1.143).

### ***Claim Objections***

Claims 2, 7-11 and 16 objected to under 37 CFR 1.75(c), as being of improper dependent form for failing to further limit the subject matter of a previous claim.

Applicant is required to cancel the claim(s), or amend the claim(s) to place the claim(s) in proper dependent form, or rewrite the claim(s) in independent form.

Claims 7-11, which are dependent on claim 1, recite the limitation of "electroplating conductive material"; this limitation is already in claim 1. Similarly, claims 7, 9 and 11 recite the limitation of "forming an aperture through the insulating layer" which is already in claim 1. Applicant appears to limit the dependent claims by forming different products, such as a spring metal side interconnect and a conductive lead side interconnect; however, since these are method claims and process steps of making these products are the same, the instant claims fail to further limit the subject matter of a previous claim.

Regarding claim 7, the phrase "at least one of the spring metal layer and conductive lead layer" appears to mean that the aperture is formed through both layers on the same aperture.

Regarding claim 8 and 16, it is unclear what "its" is referred to.

The claim limitation of "spring metal side contact" recited in claim 10 lacks antecedent basis.

***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

Claims 1-11,14, and 16-17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Cowles et al. in view of Shangguan et al.

Cowles et al. teach a method for forming an electrical interconnect on an integrated lead suspension of the type having a spring metal layer (stainless steel layer 302, figure2), a conductive lead layer 306 (figure 2) and an insulating layer 304 (figure 2) separating portions of the spring metal and conductive lead layers, including: forming

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an aperture 300 (figure 2) through at least the insulating layer and the conductive lead layer; and filling the vias with plated solder or screen solder to connect a stainless steel layer to the copper layer (column 3 lines 63-67). The solder is applied through a mask as indicated in figure 2 and removing the mask after solder 308 is formed. Further, Cowles et al. teach that "the same can be done from the stainless steel to the copper layer. Instead of opening the via from copper layer to stainless steel layer, the via is open from the stainless steel layer to the surface of the copper layer through the dielectric layer" (column 2 lines 37-41). With respect to forming an electrical interconnect, bond pad interconnect, spring metal side interconnect and conductive lead side interconnect, these limitations are products formed by the process and are an intended use of the instant invention and thus are not given patentability weight.

The difference between the reference to Cowles et al. and the instant claims is that the reference uses solder to form the interconnect instead of electroplating a conductive metal on the interconnect (claims 1, 7-11, 14-17); the reference also does not explicitly teach further electroplating gold on the interconnect (claims 2-4); nor forming a nickel layer (claim 5).

Shangguan et al. teach a method to form an interconnection between integrated circuit boards and integrated circuits. The method involves metallization of the bond pad and multiple, novel bump compositions and coating compositions to provide an interconnection which is reliable and which withstands differences in the coefficient of

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thermal expansion between the silicon device in the bump material (Abstract). The metalization is formed by electroplating copper over the interconnect (column 3 lines 51-56). This method is advantageous over conventional solder bumps, because it "is inexpensive, consumes a minimal amount of space, and does not require the use of wire bonding" (column 2 lines 59-63). In addition, Shangguan et al. teach depositing a nickel layer to prevent the diffusion of copper (column 4 lines 15-19), and depositing a gold layer "to provide corrosion protection for the bump during the service of the module" (column 4 lines 59-61).

Addressing claims 1, 6-11, 14-17, it would have been obvious to one having ordinary skill in the art at the time the invention was made to have modified the method of Cowles et al. by electroplating a conductive material as taught by Shangguan et al. instead of using solder, because electroplating allows the formation of a high density fine pitch interconnection and is affordable (column 2 lines 44-49).

Addressing claims 2-4, it would have been obvious to one having ordinary skill in the art at the time the invention was made to have modified the method of Cowles et al. by electroplating a gold film of Lesh et al., because electroplating a gold film would provide a corrosion barrier for the interconnect.

Addressing claim 5, it would have been obvious to one having ordinary skill in the art at the time the invention was made to have modified the method of Cowles et al. by

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forming a nickel film of Shangguan et al., because it would provide a diffusion barrier between the underlying conductive substrate and the copper layer.

Claims 12 and 13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Cowles et al. in view of Shangguan et al., and further in view of Gay et al.

Cowles et al. teach the method as described above in addressing claim(s) 1.

The difference between the reference to Cowles et al. and the instant claims is that the reference does not explicitly teach removing oxide from the substrate before electroplating.

Gay et al. teach a method for anodic cleaning of a stainless steel substrate in order to improve to adhesion between the plated layer and the stainless steel (column 1 lines 37-43).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have modified the method of Cowles et al. and Shangguan et al. by removing oxide from the substrate before electroplating as taught by Gay et al., because it would improve to adhesion of the plated layer and the stainless steel.



Claim 15 is rejected under 35 U.S.C. 103(a) as being unpatentable over Cowles et al. in view of Shangguan et al., and further in view of Lesh et al.

Cowles et al. teach the method as described above in addressing claim(s) 14.

The difference between the reference to Cowles et al. and the instant claims is that the reference does not explicitly teach that the thickness of the solder.

Lesh et al. teach forming an interconnecting element in an integrated circuit, wherein the interconnection comprises electroplating layers of titanium, copper, nickel and gold (column 1 lines 45-54). The copper serves as the primary conductor (column 1 lines 45-54) and is electroplated to an optimum thickness (column 3 lines 1-17).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have modified the method of Cowles et al. and Shangguan et al. by electroplating the metal to the height of the conductive material layer as suggested by Lesh et al., because the optimal metal thickness can be selected to satisfy sheet resistant requirements of the interconnect (column 4 lines 34-47).

### ***Conclusion***

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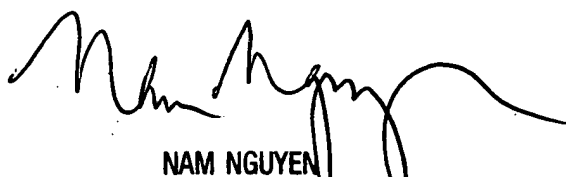
The prior art made of record and not relied upon is considered pertinent to the applicant's disclosure. Ainslie et al. also teach the copper can be electroplated on a stainless steel flexure on the solder- wettable region (column 8 line 6-9).

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Luan V. Van whose telephone number is 571-272-8521. The examiner can normally be reached on M-F 8:30-5:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nam Nguyen can be reached on 571-272-1342. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

LVV  
12/7/05



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